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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/689,198

10/20/2003

Joseph D. Rainville

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EXAMINER

ECHELMMEYER, ALIX ELIZABETH

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/689,198	<b>Applicant(s)</b> RAINVILLE ET AL.	
	<b>Examiner</b> Alix Elizabeth Echelmeyer	<b>Art Unit</b> 1795	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 January 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 10, 17 and 20-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10, 17 and 20-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. This Office Action is in response to the amendment filed January 29, 2009. Claims 10, 21 and 26 have been amended. Claims 1-9, 11-16, 18 and 19 were previously cancelled. Claims 10, 17 and 20-26 are pending and are rejected finally for the reasons given below.

### ***Claim Rejections - 35 USC § 103***

2. The rejection under 35 U.S.C. 112, second paragraph, of claims 10, 17 and 20-26 is withdrawn in light of the amendment.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 10, 17 and 20-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lahiff (US 2003/0068538) in view of Arnold et al. (US 6,647,724).

Lahiff teaches a compressor for controlling oxidant to a fuel cell (abstract). The compressor is controlled by a controller ([0040]).

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Lahiff teaches using electricity derived from regeneratively braking a motor in the included in the same system as the compressor to charge a storage battery ([0033]).

Lahiff further teaches using the storage battery to power the compressor ([0045]).

Lahiff teaches changing the efficiency of the compressor by using valves to cut off supply of oxidant to the fuel cell when it is desired to provide less oxidant (abstract, [0050]). The output of the stack is controlled by the air that is provided by the compressor ([0030]).

With regard to claim 17, the battery, or supplemental power source, of Lahiff can be charged by electricity generated by the fuel cell ([0045]).

Lahiff fails to teach varying the speed of the compressor instead of using valves to control the output.

Arnold et al. teach a variable speed compressor used to provide air (column 4 lines 26-36). The compressor has variable speed and is driven by a motor (column 3 lines 49-65).

The compressor further comprises a controller that can switch the power to the motor from one source to another, which allows for recharging of the power source not being used (column 4 lines 59-66). With regard to claim 18, the second power source is used during intermittent bursts of power, or rapid transient modes upward and the power source may be a capacitor or supercapacitor (column 5 line 66 - column 6 line 19).

When the compressor returns to normal operation after a burst, the capacity is inherently lower during normal operation as compared to during the burst.

It would be desirable to use the variable speed compressor system Arnold et al. to vary the amount of oxidant provided to the fuel cell of Lahiff, instead of the compressor and valve system of Lahiff, since it would reduce the need for valves in the system, thus making the system more simple. Additionally, the variable speed would reduce waste air, since only the oxidant needed by the fuel cell would be provided.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the variable speed compressor system Arnold et al. to vary the amount of oxidant provided to the fuel cell of Lahiff, instead of the compressor and valve system of Lahiff, since it would reduce the need for valves in the system, thus making the system more simple. Additionally, the variable speed would reduce waste air, since only the oxidant needed by the fuel cell would be provided.

Lahiff in view of Arnold et al. fail to teach the claimed "threshold rate" for the compressor. Lahiff teaches that the amount of power produced by the fuel cell is influenced by the amount of air provided to the fuel cell ([0030]). In the above combination, the compressor of Arnold et al. is used to control the amount of air provided. It would have been obvious to one having ordinary skill in the art at the time the invention was made to determine rate at which air should be provided to the fuel cell of Lahiff, using the compressor of Arnold et al. to control the rate, since controlling the

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air controls the electrical output of the fuel cell. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. MPEP 2144.05 (IIB).

Lahiff in view of Arnold et al. fail to teach that the motor used to drive the compressor is regeneratively braked to charge the battery. Lahiff does teach regenerative braking of another motor in the system, where the derived current is used to charge the battery ([0003]). One of ordinary skill in the art would recognize the advantages with using regenerative braking of a motor to charge a battery: energy that might otherwise be wasted during braking can be conserved.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to capture the braking energy from the motor used for the compressor of Lahiff in order to conserve that energy that would otherwise be lost.

### ***Response to Arguments***

5. Applicant's arguments filed January 29, 2009 have been fully considered but they are not persuasive.

Beginning on page 6 of the response, Applicant argues that Lahiff et al. teach braking the vehicle motor, not the compressor motor. The examiner agrees, but the rejection, see above, states that it would have been obvious to one having ordinary skill in the art at the time of the invention was made, in light of the teachings of Lahiff et al. in

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view of Arnold et al., to regeneratively brake the compressor motor in view of the teachings of Lahiff et al. to regeneratively brake the vehicle motor. One of ordinary skill in the art is more than capable of recognizing the benefit of regeneratively braking the vehicle motor and applying the same principles to the compressor motor. See MPEP 2141 III.

On the top of page 7, Applicant argues that Lahiff et al. teach that the compressor of Lahiff et al. is used “to dissipate electrical energy, not generate it.” The examiner finds that Applicant has either misunderstood or misrepresented the teachings of Lahiff et al. While Lahiff et al. do teach that the compressor is used to dissipate energy, it is also taught to generate energy. The energy being dissipated is the energy from the regenerative braking that is left after the batteries charged by the regenerative braking have been fully charged ([0006]). The compressor, in addition to being used to provide oxidant to the fuel cell in order to generate energy, is used to dissipate the extra energy from the regenerative braking by producing more oxidant than is required by the fuel cell, and then using valves to prevent all of the air from going in to the fuel cell ([0011]). So, the compressor of Lahiff et al. is certainly used to generate electricity as well as dissipate it (see second sentence of [0011]).

Additionally, Applicant argues that Arnold et al. do not teach a variable speed compressor, arguing that the compressor of Arnold et al. operates only at one speed and alternates from being on and off. Applicant is again directed to the teachings of Arnold et al., specifically at column 6 lines 12-19. It is taught that a power boost is provided by capacitors, after which power to the compressor is switched back to

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another source, such as the electric turbine unit. Further, in Figure 7 of Arnold et al., it is taught that the power provided to the compressor is adjusted (as opposed to turned on or off) in response to the detected needs for airflow.

The important teaching of Arnold et al. that is used in the combination of Lahiff et al. in view of Arnold et al. is that the compressor has variable speed. Even if Arnold et al. teach turning the compressor off in times when it is not needed, Lahiff et al. teach the use of the compressor to provide oxidant to the fuel cell in order to generate power. One of ordinary skill in the art would recognize that, although the compressor of Arnold et al. is sometimes turned off, if the compressor was used in the system of Lahiff et al. it would not be turned off unless the fuel cell system was not being used to generate electricity. The teaching of a variable speed compressor based on the requirements of the fuel cell system in Arnold et al. is applicable in the fuel cell system of Lahiff et al., and the compressor of Arnold et al. is capable of providing the air as required by the system of Lahiff et al. One of ordinary skill in the art would know to look to the teachings of Lahiff et al. to determine the compressor is on when air is needed, and to the teachings of Arnold et al. to use the compressor to provide more or less air by adjusting the power to the compressor.

As for the final paragraph of page 7, it is clearly taught in Lahiff et al. that the compressor may be run on either a motor or stored power. The compressor of Arnold et al. also runs on stored power, and in the system of Lahiff et al. could obviously be run on the motor or stored power already in the system.



***Conclusion***

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is (571)272-1101. The examiner can normally be reached on Mon-Fri 8-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/PATRICK RYAN/  
Supervisory Patent Examiner, Art Unit 1795

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